National Institute of Environmental Health Sciences

Public health benefits of strategies to reduce greenhouse-gas emissions: Low-carbon electricity generation

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Abstract:

In this report, the third in this Series on health and climate change, we assess the changes in particle air pollution emissions and consequent effects on health that are likely to result from greenhouse-gas mitigation measures in the electricity generation sector in the European Union (EU), China, and India. We model the effect in 2030 of policies that aim to reduce total carbon dioxide (CO(2)) emissions by 50% by 2050 globally compared with the effect of emissions in 1990. We use three models: the POLES model, which identifies the distribution of production modes that give the desired CO(2) reductions and associated costs; the GAINS model, which estimates fine particulate matter with aerodynamic diameter 2.5 microm or less (PM(2.5)) concentrations; and a model to estimate the effect of PM(2.5) on mortality on the basis of the WHO's Comparative Risk Assessment methods. Changes in modes of production of electricity to reduce CO(2) emissions would, in all regions, reduce PM(2.5) and deaths caused by it, with the greatest effect in India and the smallest in the EU. Health benefits greatly offset costs of greenhouse-gas mitigation, especially in India where pollution is high and costs of mitigation are low. Our estimates are approximations but suggest clear health gains (co-benefits) through decarbonising electricity production, and provide additional information about the extent of such gains.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Other Climate Scenario

Other Climate Scenario: POLES; GAINS

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Unspecified Exposure

Air Pollution: Particulate Matter

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Asia, Europe

Asian Region/Country: China, India

European Region/Country: European Region

Other European Region: European Union

Health Co-Benefit/Co–Harm (Adaption/Mitigation): ☑

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

A focus of content

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Respiratory Effect

Cardiovascular Effect: Other Cardiovascular Effect

Cardiovascular Disease (other): cardiorespiratory mortality

Respiratory Effect: Lung Cancer, Other Respiratory Effect

Respiratory Condition (other) : acute respiratory infections;cardiorespiratory mortality

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Mitigation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Cost/Economic, Outcome Change Prediction

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Children

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Medium-Term (10-50 years)